ABSTRACT OF THE DISCLOSURE

A system and method for desorption and ionization of analytes in an ablation medium. In one embodiment, the method includes the steps of preparing a sample having analytes in a medium including at least one component, freezing the sample at a sufficiently low temperature so that at least part of the sample has a phase transition, and irradiating the frozen sample with short-pulse radiation to cause medium ablation and desorption and ionization of the analytes. The method further includes the steps of selecting a resonant vibrational mode of at least one component of the medium and selecting an energy source tuned to emit radiation substantially at the wavelength of the selected resonant vibrational mode. The medium is an electrophoresis medium having polyacrylamide. In one embodiment, the energy source is a laser, where the laser can be a free electron laser tunable to generate short-pulse radiation. Alternatively, the laser can be a solid state laser tunable to generate short-pulse radiation. The laser can emit light at various ranges of wavelength.

*   *   *   *   *

W108245